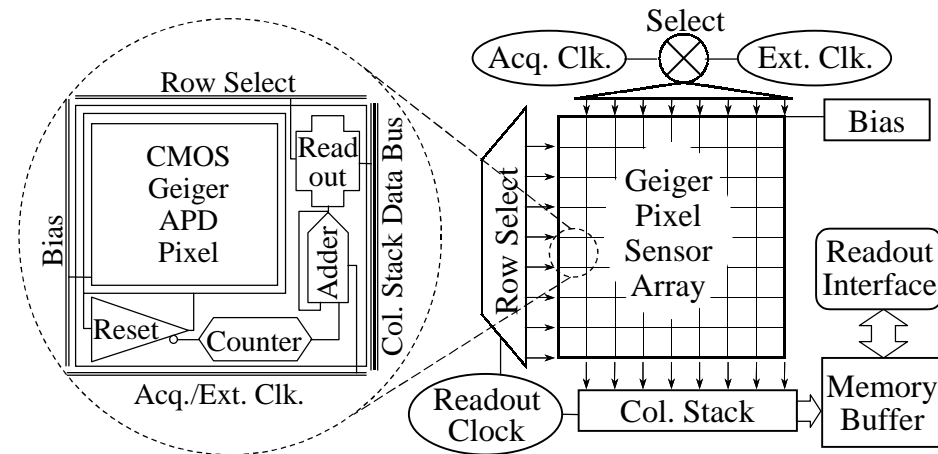


# All-digital CMOS-based Photodiode Camera

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## Identification and Significance of Innovation

- The readout of the analog signal in both CCD and CMOS APS cameras introduces noise, which limits their sensitivity and performance.
- Migrating Geiger APD pixel technology to a CMOS compatible process enables the development of a fully integrated, all-digital camera that counts individual optical photons.
- As the next stage in the evolution of CMOS APS camera technology, the proposed camera provides an ideal platform for integrating digital signal-processing capabilities at the pixel level.



## Technical Objectives

- Determine the best CMOS process, available through MOSIS, for fabricating CMOS Geiger APD pixels, extending the nearIR performance, & integrating quenching & signal processing circuits;
- Specify design goals for the all-digital, CMOS Geiger APD camera.

## Work Plan

1. Survey the CMOS fabrication processes available through MOSIS;
2. Estimate and model the performance of the Geiger APD pixels;
3. Design circuit concept for quenching the Geiger avalanche;
4. Fabricate prototype Geiger APD pixels and quenching circuits;
5. Test and characterize prototype Geiger APD pixels;
6. Specify Design Goals for the CMOS Geiger APD camera.

## NASA Applications

Airborne, spaceborne or UAV instruments for measuring climate, meteorological parameters, aerosols, clouds, water vapor, vegetation index, chlorophyll fluorescence, 2D and 3D surface terrain mapping.

## Non-NASA Applications

Widespread use in high-performance imaging instrumentation for defense and medical applications, including LADAR and DOT.

## Contacts

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